

MILITARY SPECIFICATION  
MICROCIRCUITS, DIGITAL, CMOS, SWITCHES,  
MONOLITHIC SILICON, POSITIVE LOGIC

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, CMOS logic microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided and are reflected in the complete part number.

1.2 Part number. The part number shall be in accordance with MIL-M-38510.

1.2.1 Device type. The device type shall be as follows:

<u>Device type</u>	<u>Circuit</u>
01	Quad bilateral switch
02	Quad bilateral switch
51	Quad bilateral switch
52	Quad bilateral switch

1.2.2 Device class. The device class shall be the product assurance level as defined in MIL-M-38510.

1.2.3 Case outline. The case outline shall be designated as follows:

<u>Outline letter</u>	<u>Case outline (see MIL-M-38510, appendix C)</u>
A	F-1 (14-lead, 1/4" x 1/4"), flat package
C	D-1 (14-lead, 1/4" x 3/4"), dual-in-line package
D	F-2 (14-lead, 1/4" x 3/8"), flat package
X	F-1 (14-lead, 1/4" x 1/4"), flat package, except A dimension = 0.1" (2.54 mm maximum)
Y	F-2 (14-lead, 1/4" x 3/8"), flat package, except A dimension = 0.1" (2.54 mm maximum)

NOTES:

- As an exception to 3.5.6.2.3 of MIL-M-38510, for case outlines X and Y only, the leads of bottom brazed ceramic packages (i.e., configuration 2 of case outlines F-1 and F-2) may have electroless nickel undercoating which shall be 50 to 200 microinches (1.27 to 5.08  $\mu$ m) thick provided the lead finish is hot solder dip (i.e., finish letter A) and provided that, after any lead forming, an additional hot solder dip coating is applied which shall extend from the outer tip of the lead to no more than 0.015 inch (0.38 mm) from the package edge.
- For bottom or side braided packages, case outlines X and Y only, the S<sub>1</sub> dimension may go to .000 inch (.00 mm) minimum.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: NASA Parts Project Office, Code 311.A, NASA/Goddard Space Flight Center, Greenbelt, MD 20771 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

**1.3 Absolute maximum ratings.**

Supply voltage range ( $V_{DD}$ - $V_{SS}$ )	
Device types 01 and 02-	-0.5 V to +15.5 V
Device types 51 and 52-	-0.5 V to +18.0 V
Input current (each input)-	$\pm 10 \text{ mA}$
Input voltage range -	$(V_{SS} - 0.5 \text{ V}) \leq V_I \leq (V_{DD} + 0.5 \text{ V})$
Storage temperature range -	-65°C to +175°C
Maximum power dissipation ( $P_D$ )-	175 mW
Lead temperature (soldering, 10 seconds)-	+300°C
Thermal resistance, junction-to-case ( $\theta_{JC}$ ):	(See MIL-M-38510, appendix C)
Junction temperature ( $T_J$ )	+175°C

**1.4 Recommended operating conditions.****Supply voltage:**

Device types 01 and 02-	4.5 V dc to 12.5 V dc
Device types 51 and 52-	4.5 V dc to 15 V dc

**Minimum high-level input voltage ( $V_{IH}$ ):**

Device types 01 and 02-	2.05 - 5.0 V dc @ $V_{DD} = 5 \text{ V}$ ; 11.85 - 12.5 V dc @ $V_{DD} = 12.5 \text{ V}$
Device types 51 and 52-	3.5 - 5.0 V dc at $V_{DD} = 5 \text{ V}$ , 8.0 - 10.0 V dc @ $V_{DD} = 10 \text{ V}$ , 11.0 - 15.0 V dc @ $V_{DD} = 15 \text{ V}$ $V_{OL} = 10\% V_{DD}$ , $V_{OH} = 90\% V_{DD}$

**Minimum low-level input voltage range ( $V_{IL}$ ):**

Device types 01 and 02-	0 - 0.95 V dc @ $V_{DD} = 5 \text{ V}$ ; 0 - 2.4 V dc @ $V_{DD} = 12.5 \text{ V}$
Device types 51 and 52-	0 - 1.5 V dc at $V_{DD} = 5 \text{ V}$ , 0 - 2.0 V dc @ $V_{DD} = 10 \text{ V}$ , 0 - 4.0 V dc @ $V_{DD} = 15 \text{ V}$ , $V_{OL} = 10\% V_{DD}$ , $V_{OH} = 90\% V_{DD}$

Load capacitance- 50 pF maximum  
Case operating temperature range ( $T_C$ ) -55°C to +125°C

**2. APPLICABLE DOCUMENTS****2.1 Government documents**

**2.1.1 Specification and standard.** The following specification and standard form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

**SPECIFICATION****MILITARY**

MIL-M-38510 - Microcircuits, General Specification for.

**STANDARD****MILITARY**

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

**2.2 Order of precedence.** In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-M-38510, and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein. Although eutectic die bonding is preferred, epoxy die bonding may be performed. However, the resin used shall be Dupont 5504 Conductive Silver Paste, or equivalent which is cured at  $200^{\circ}\text{C} \pm 10^{\circ}\text{C}$  for a minimum of 2 hours. The use of equivalent epoxies or cure cycles shall be approved by the qualifying activity. Equivalency shall be demonstrated in data submitted to the qualifying activity for verification.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Truth table. The truth table shall be as specified on figure 2.

3.2.3 Schematic circuits. The schematic circuits, including protection networks, shall be submitted to the preparing activity prior to inclusion of a manufacturer's device in this specification and shall be submitted to the qualifying activity as a prerequisite for qualification. All qualified manufacturers' schematics shall be maintained and available upon request.

3.2.4 Case outlines. The case outlines shall be as specified in 1.2.3.

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510 and 6.4 herein.

3.4 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended ambient operating temperature range, unless otherwise specified.

3.5 Electrical test requirements. The electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.6 Marking. Marking shall be in accordance with MIL-M-38510.

3.6.1. Total dose radiation hardness identifier. Total dose radiation hardness identifier shall be in accordance with MIL-M-38510 and 4.5.5 herein.

3.6.2 Serialization. All class S devices shall be serialized in accordance with MIL-M-38510.

3.6.3 Correctness of indexing and markings. All devices shall be subjected to the final electrical tests specified in table II after part number marking to verify that they are correctly indexed and identified by part number. Optionally, an approved electrical test may be devised especially for this requirement.

3.7 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 39 (see MIL-M-38510, appendix E).

### 4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and methods 5005 and 5007, as applicable, of MIL-STD-883, except as modified herein.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

- a. Delete the sequence specified in initial (pre-burn-in) electrical parameters (3.1.10) through interim (post-burn-in) electrical parameters (3.1.14) and substitute lines 1 through 7 of table II herein.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $V_{SS} = 0 \text{ V}$ $-55^\circ\text{C} \leq T_C \leq 125^\circ\text{C}$ Unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Positive clamping input to $V_{DD}$	$V_{IC(\text{pos})}$	$T_C = 25^\circ\text{C}$ , $V_{DD} = \text{GND}$ $V_{SS} = \text{Open}$ , Output = Open, $I_I = 1 \text{ mA}$	A11	---	1.5	V
Negative clamping input to $V_{SS}$	$V_{IC(\text{neg})}$	$T_C = 25^\circ\text{C}$ , $V_{DD} = \text{Open}$ $V_{SS} = \text{GND}$ , Output = Open $I_I = -1 \text{ mA}$	A11	---	-6	V
Quiescent supply current	$I_{SS}$	$V_{DD} = 15 \text{ V dc}$ any combination of inputs	A11	---	-550	nA
High level output voltage	$V_{OH1}$	$V_{IN} = 5 \text{ V}$ , $V_{DD} = 5 \text{ V dc}$ , $I_{OH} = 0$ , Control input = $V_{IH}$ (see table III)	01, 02	4.95	---	V
	$V_{OH2}$	$V_{IN} = 12.5 \text{ V}$ , $V_{DD} = 12.5 \text{ V dc}$ , $I_{OH} = 0$ , Control input = $V_{IH}$ (see table III)	01, 02	11.25	---	V
	$V_{OH3}$	$V_{IN} = 15 \text{ V}$ , $V_{DD} = 15 \text{ V dc}$ , $I_{OH} = 0$ , Control input = $V_{IH}$	51, 52	14.95	---	V
Low level output voltage	$V_{OL1}$	$V_{IN} = 0 \text{ V}$ , $V_{DD} = 5 \text{ V dc}$ , $I_{OL} = 0$ , A11 control inputs = $V_{IH}$ (see table III)	01, 02	---	-.05	V
	$V_{OL2}$	$V_{IN} = 0 \text{ V}$ , $V_{DD} = 12.5 \text{ V dc}$ , $I_{OL} = 0$ , A11 control inputs = $V_{IH}$ (see table III)	01, 02	---	1.25	V
	$V_{OL3}$	$V_{IN} = 0 \text{ V}$ , $V_{DD} = 15 \text{ V dc}$ , $I_{OL} = 0$ , A11 control inputs = $V_{IN}$	51, 52	---	0.05	V
Input high control voltage	$V_{IH1}$	$V_{DD} = 5 \text{ V dc}$ $V_O = 0.5 \text{ V}$ $ I_O  \leq 1 \mu\text{A}$	51, 52	3.5	---	V
	$V_{IH2}$	$V_{DD} = 10 \text{ V dc}$ $V_O = 1.0 \text{ V}$ $ I_O  \leq 1 \mu\text{A}$	51, 52	7.0	---	V
	$V_{IH3}$	$V_{DD} = 15 \text{ V dc}$ $V_O = 1.5 \text{ V dc}$ $ I_O  \leq 1 \mu\text{A}$	51, 52	11.0	---	V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $V_{SS} = 0 \text{ V}$ $-55^{\circ}\text{C} \leq T_C \leq 125^{\circ}\text{C}$ Unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Input low control voltage	$V_{IL1}$	$V_{DD} = 5 \text{ V dc}$ $V_0 \leq 0.5 \text{ V}$ $ I_0  \leq 1 \mu\text{A}$	52 51	---	1.5	V
				---	1.0	V
				---	3.0	V
	$V_{IL2}$	$V_{DD} = 10 \text{ V dc}$ $V_0 \leq 1.0 \text{ V}$ $ I_0  \leq 1 \mu\text{A}$	52 51	---	2.0	V
				---	4.0	V
				---	2.5	V
Output low (sink) current	$I_{OL1}$	$V_{DD} = 5 \text{ V dc}$ , $V_{IN} = 5 \text{ V}$ $V_{OL} = 0.4 \text{ V dc}$	51, 52	0.36	---	mA dc
				2.4	---	mA dc
Output high (source) current	$I_{OH1}$	$V_{DD} = 5 \text{ V dc}$ , $V_{OH} = 4.5 \text{ V}$ $V_{IN} = 5 \text{ V}$	51, 52	-0.36	---	mA dc
				-2.4	---	mA dc
Input leakage current 2/	$I_{IH}$	Measure inputs sequentially $V_{DD} = 15 \text{ V dc}$ $V_{DD} = 18 \text{ V dc}$	01, 02 51, 52	---	45	nA
				---	-45	nA
Input test voltage	$V_{ZAP}$	$C_L = 100 \text{ pF}$ $R_2 = 1.5 \text{ k}\Omega$ (see 4.5.3)	A11	400	---	V
				---	12	pF
Input capacitance	$C_{ic}$	$V_{DD} = 0 \text{ V dc}$ , $f = 1 \text{ MHz}$ $T_C = 25^{\circ}\text{C}$	A11	---	15	pF
				---	20	pF
Input cap	$C_{is}$	$V_{DD} = 5 \text{ V dc}$ , $f = 1 \text{ MHz}$ $T_C = 25^{\circ}\text{C}$	01, 51 02, 52	15	20	pF
				15	20	pF
Output cap	$C_{os}$		01, 51 02, 52	15	20	pF
				15	20	pF
Feedthrough cap	$C_{ics}$		01, 51 02, 52	15	20	pF
				15	20	pF

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $V_{SS} = 0 \text{ V}$ $-55^\circ\text{C} \leq T_C \leq 125^\circ\text{C}$ Unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Propagation delay times, switch input to output	$t_{PHL}$	$V_{DD} = 5 \text{ V dc}, C_L = 50 \text{ pF}$ (see figure 5) $R_L = 200 \text{ k}\Omega$	01, 51	4	156	ns
			02, 52	4	90	ns
Propagation delay times, control input to switch output	$t_{PLH}$		01, 51	4	130	ns
			02, 52	4	85	ns
Switch "ON" resistance	$R_{ON1}$	$V_{DD} = 5.0 \text{ V dc}$ $V_{SS} = \text{GND}$	01, 51	---	1.8k	$\Omega$
			02, 52	---	600	$\Omega$
	$R_{ON2}$	$V_{DD} = 7.5 \text{ V dc}$ $V_{SS} = -7.5 \text{ V dc}$	01, 51	---	450	$\Omega$
			02, 52	---	250	$\Omega$
	$R_{ON3}$	$V_{DD} = 10.0 \text{ V dc}$ $V_{SS} = \text{GND}$	01, 51	---	750	$\Omega$
			02, 52	---	300	$\Omega$
Switch leakage current	$I_{DOFF1}$	$V_{DD} = +5.0 \text{ V dc}, V_{SS} = 0 \text{ V dc}$	A11	---	45	nA
	$I_{DOFF2}$	$V_{DD} = 0 \text{ V dc}, V_{SS} = -5.0 \text{ V dc}$				
	$I_{DOFF3}$	$V_{DD} = +10.0 \text{ V dc},$ $V_{SS} = 0 \text{ V dc}$				
	$I_{DOFF4}$	$V_{DD} = 0 \text{ V dc},$ $V_{SS} = -10.0 \text{ V dc}$				
	$I_{DOFF5}$	$V_{DD} = +15 \text{ V dc}, V_{SS} = 0 \text{ V dc}$				
	$I_{DOFF6}$	$V_{DD} = 0 \text{ V dc},$ $V_{SS} = -15.0 \text{ V dc}$				

1/ Complete terminal conditions shall be as specified in table III.

2/ Input current at node.

TABLE II. Burn-in and electrical test requirements.

Line no.	Applicable tests and MIL-STD-883 test methods	Class S device 1/				Class B device 1/			
		Ref. par.	Table 2/ III sub-groups	Table 1/ IV delta limits	Test circuit figure	Ref. par.	Table 2/ III sub-groups	Table 1/ IV delta limits	Test circuit figure
1	Interim electrical parameters (method 5004)		1				1		
2	Static burn-in I (method 1015)	4.2b 4.5.2			3				
3	Same as Line 1		1	Δ					
4	Static burn in II (method 1015)	4.2b 4.5.2			3 4.2d 4.5.2	4/			3
5	Same as Line 1	4.2d	1*	Δ		4.2	1*	Δ	
6	Dynamic burn-in (method 1015)	4.2b 4.5.2			4				
7	Same as Line 1	4.2d	1*	Δ					
8	Final electrical parameters (method 5004)		1*,2,3,9				1*,2,3,9		
9	Group A end-point electrical parameters (method 5005)	4.4.1	1,2,3,4, 9,10,11			4.4.1	1,2,3, 4,9,10, 11		
10	Group B end-point electrical parameters (method 5005)	4.4.2c	1,2,3,9, 10,11	*					
11	Group C end-point electrical parameters (method 5005)					4.4.3	1,2,3	Δ	
12	Group D end-point electrical parameters (method 5005)	4.4.4	1,2,3			4.4.4	1,2,3		

1/ Blank spaces indicate tests are not applicable.

2/ (\*) indicates PDA applies to subgroup 1 (see 4.2.1).

3/ (Δ) indicates delta limit shall be required on table III subgroup 1 where specified, and delta values shall be computed with reference to the previous interim electrical parameters.

4/ The device manufacturer may at his option either perform delta measurements or within 24 hours after burn-in (or removal of bias) perform the final electrical parameter measurements.

b. Burn-in (method 1015 of MIL-STD-883).

- (1) Static tests (test condition A) using circuit shown on figure 3 or equivalent. Ambient temperature ( $T_A$ ) shall be 125°C minimum. Test duration for each static test shall be 24 hours minimum for class S devices and in accordance with table I of method 1015 for class B devices.
- (2) Dynamic test (test condition D) using circuit shown on figure 4 or equivalent. Ambient temperature ( $T_A$ ) shall be 125°C minimum. Test duration shall be in accordance with table I of method 1015.

c. Interim and final electrical parameters shall be as specified in table II herein.

d. For class S devices, post dynamic burn-in, or class B devices, post static burn-in, electrical parameter measurements may, at the manufacturer's option, be performed separately or included in the final electrical parameter requirements.

**4.2.1 Percent defective allowable (PDA).**

- a. The PDA for class S devices shall be 5 percent for static burn-in and 5 percent for dynamic burn-in, based on the exact number of devices submitted to each separate burn-in.
- b. Static burn-in I and II failures shall be cumulative for determining PDA.
- c. The class B devices PDA shall be in accordance with MIL-M-38510 for static burn-in. Dynamic burn-in is not required.
- d. Those devices whose measured characteristics after burn-in exceed the specified delta ( $\Delta$ ) limits or electrical parameter limits specified in table III, subgroup 1, are defective and shall be removed to burn-in lots. The verified failures divided by the total number of devices in lots initially submitted to burn-in shall be used to determine the percent defective for the lot and the lot shall be accepted or rejected based on the specified PDA.

**4.3 Qualification inspection.** Qualification inspection shall be in accordance with MIL-M-38510. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D and E inspections (see 4.4.1 through 4.4.5).

**4.3.1 Qualification extension.** When authorized by the qualifying activity, if a manufacturer qualifies to a 51 and 52 device type which is manufactured identically to a 01 and 02 device type on this specification, then the 01 and 02 device type may be part I qualified by conducting only group A electrical and submitting data in accordance with MIL-M-38510, appendix D.

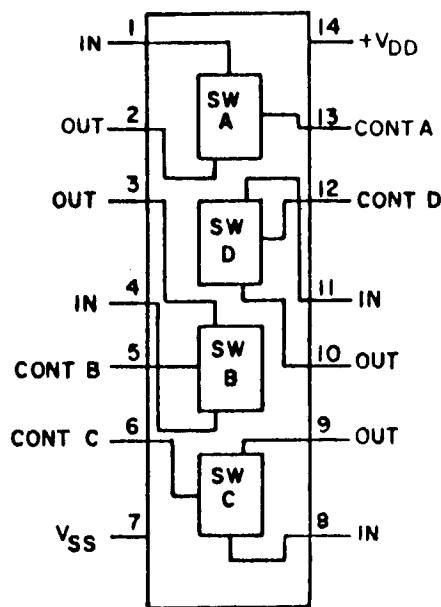
**4.4 Quality conformance inspection.** Quality conformance inspection shall be in accordance with MIL-M-38510 and as specified herein. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.5).

**4.4.1 Group A inspection.** Group A inspection shall be in accordance with table I of method 5005 of MIL-STD-883 and as follows:

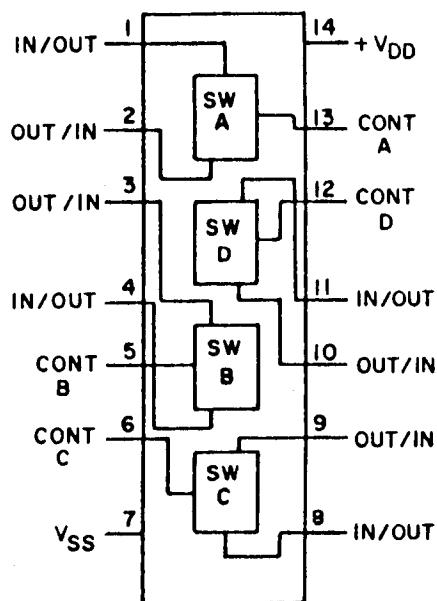
- a. Tests shall be performed in accordance with table II herein.
- b. Subgroups 5, 6, 7, and 8 of table I of method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 ( $C_J$  measurement) shall be measured only for initial qualification and after process or design changes which may affect input capacitance. Capacitance shall be measured between the designated terminal and V<sub>SS</sub> at a frequency of 1 MHz.
- d. Subgroups 9 and 11 shall be measured only for initial qualification and after process or design changes which may affect dynamic performance.
- e. At the manufacturer's option, test tapes may be programmed simultaneously for each identical section provided that each output is measured and each specified input combination is tested.
- f. When device types 01 and 02 are qualified by extension (see 4.3.1) they shall be inspected (QCI) in accordance with the requirements for corresponding device types 51 and 52.

Device types 01 and 51

Cases A, C, D, X, and Y

Device types 02 and 52

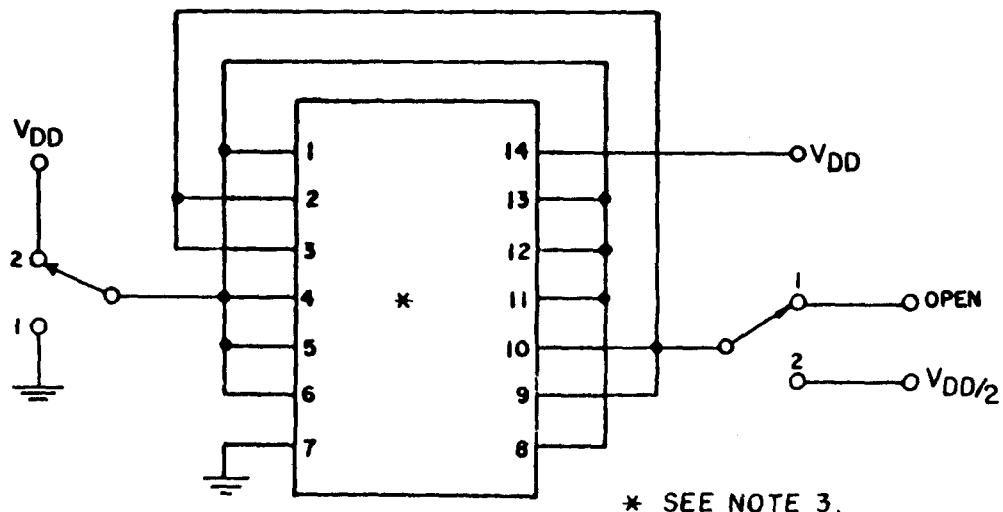
Cases A, C, D, X, and Y

FIGURE 1. Terminal connections.

Truth table each switch		
Input		Output
$V_C$	$V_{IS}$	$V_{OS}$
1	0	0
1	1	1
0	0	Open
0	1	Open

Positive logic: Switch on  $V_C$  = "1"  
Switch off  $V_C$  = "0"

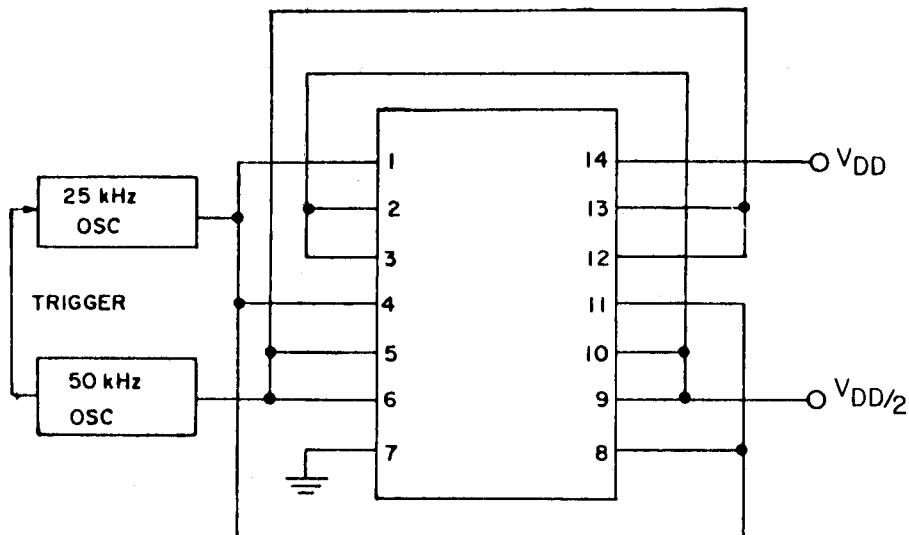
FIGURE 2. Truth table.



## NOTES:

1. For static burn-in I, all inputs are connected to 0 volts, switch position 1.
2. For static burn-in II, all inputs are connected to  $V_{DD}$ , switch position 2.
3. Except for  $V_{DD}$  and  $V_{SS}$ , terminals shall be connected through a resistor(s) whose value is 2 k $\Omega$  to 47 k $\Omega$ . The actual measured value of the resistor selected shall not exceed  $\pm 20\%$  of its branded value due to use, heat or age.
4. Output may be in switch position 1 or 2.
5.  $V_{DD} = 12.5$  V minimum, 15 V maximum for device types 01, and 02.  
 $V_{DD} = 15$  V minimum, 18 V maximum for device types 51, and 52.  
 $V_{DD}/2 = V_{DD}/2 \pm 1.0$  V for all devices.  
 $V_{SS} = 0$  V.

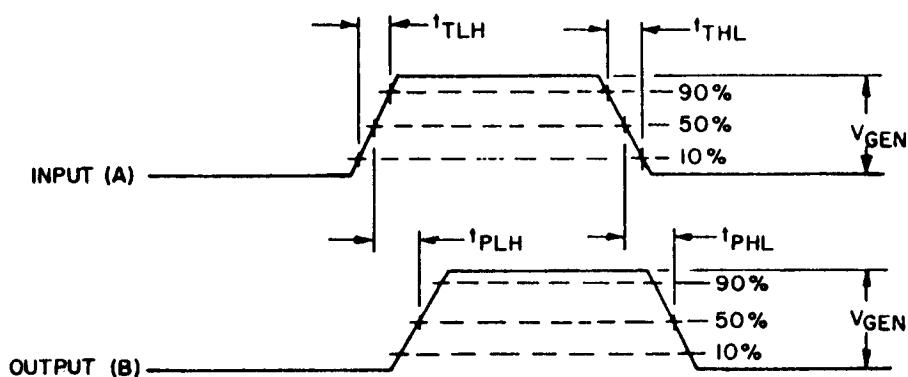
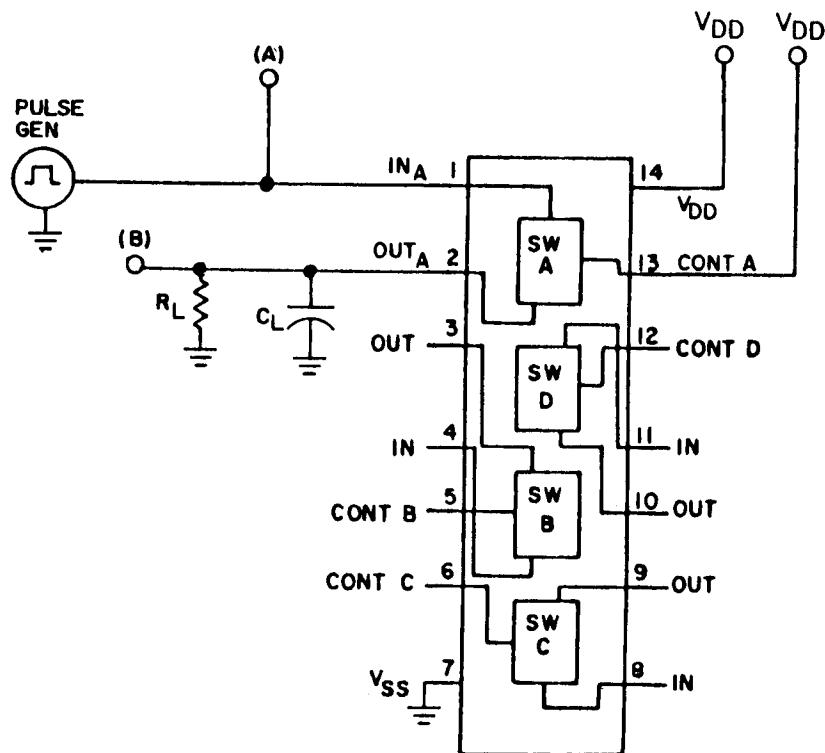
FIGURE 3. Static burn-in test circuits.



## NOTES:

1. Except for  $V_{DD}$  and  $V_{SS}$ , terminals shall be connected through a resistor(s) whose value is  $2\text{ k}\Omega$  to  $47\text{ k}\Omega$ . The actual measured value of the resistor selected shall not exceed  $\pm 20\%$  of its branded value due to use, heat or age.
2. Input signal requirements:
  - a. Square wave, 50% duty cycle.
  - b.  $25\text{ kHz} < PRR < 1\text{ MHz}$ .
  - c.  $t_{TLH}$  and  $t_{THL} < 1\text{ }\mu\text{s}$ .
  - d. Voltage level:  
Minimum =  $V_{SS} - 0.5\text{ V}$ ,  $+10\% V_{DD}$ .  
Maximum =  $V_{DD} + 0.5\text{ V}$ ,  $-10\% V_{DD}$ .
3.  $V_{DD} = 12.5\text{ V}$  minimum,  $15.0\text{ V}$  maximum for device types 01, and 02.  
 $V_{DD} = 15\text{ V}$  minimum,  $18\text{ V}$  maximum for device types 51, and 52.  
 $V_{DD}/2 = V_{DD}/2 \pm 1.0\text{ V}$ .  
 $V_{SS} = 0\text{ V}$ .

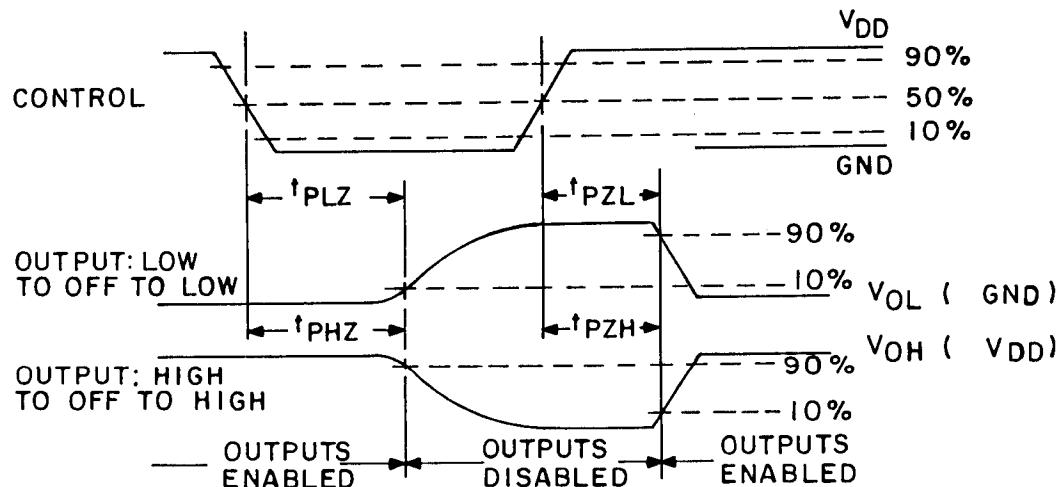
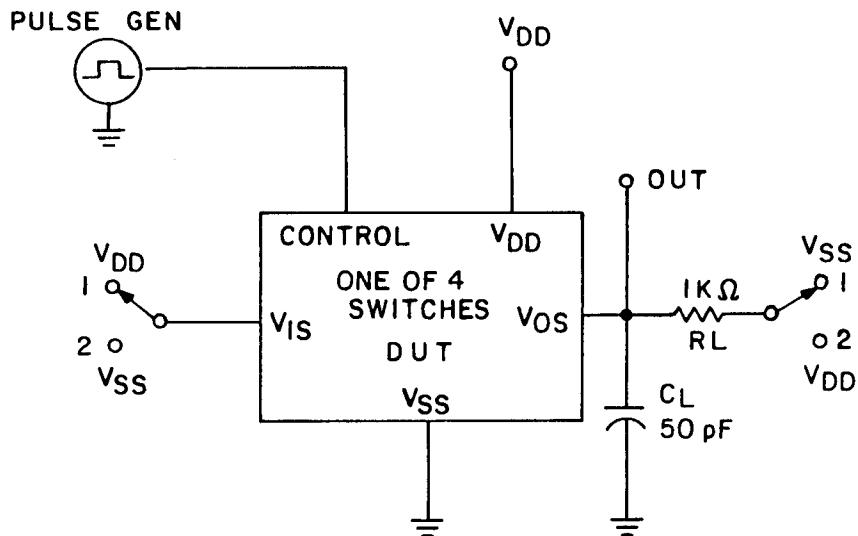
FIGURE 4. Dynamic burn-in and steady state life test circuit.



## NOTES:

1. Pulse generator conditions:  $V_{GEN} = V_{DD} \pm 1\%$ , duty cycle = 50%,  $t_{TTL}$  and  $t_{THL} = 20 \text{ ns} \pm 2.0 \text{ ns}$ , PRR = 500 KHz, and  $Z_{OUT} = 50\Omega$ .
2.  $C_L = 50 \text{ pF}$ ,  $R_L = 200 \text{ K} \pm 10\%$  ohms, includes probe and jig impedance.
3. Identical switching measurements are obtained from switch A, switch B, switch C and switch D.

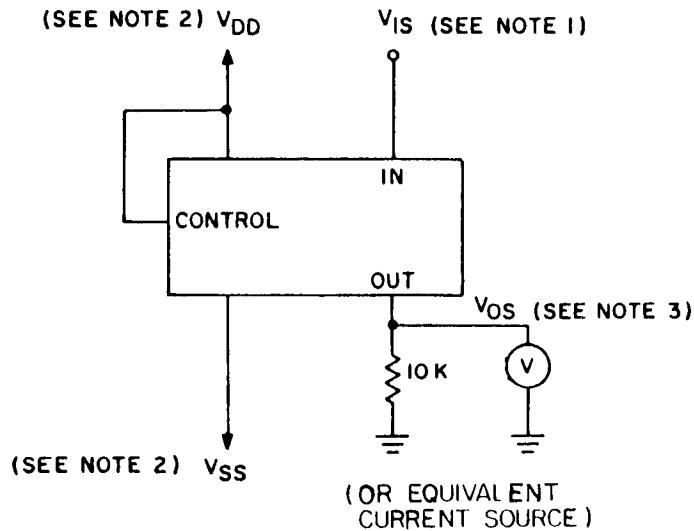
FIGURE 5. Switching time test circuit and waveforms, switch input to switch output.



## NOTES:

1. Pulse generator has the following characteristics:  $V_{GEN} = V_{DD} \pm 1\%$ , duty cycle = 50%,  $t_r$  and  $t_f \leq 20$  ns and  $Z_{OUT} = 50\Omega$ .
2.  $C_L = 50$  pF,  $R_L = 1k\Omega$ , includes probe and jig impedance.
3. Identical switching measurements are obtained from switch A, switch B, switch C and switch D.
4. Switch pos. 1 for  $t_{pzH}$ ,  $t_{pzL}$ ,  $t_{phz}$ , test; switch pos. 2 for  $t_{plz}$ ,  $t_{pzL}$ .

FIGURE 6. Switching time test circuit and waveforms, switch control input to switch output.



## NOTES:

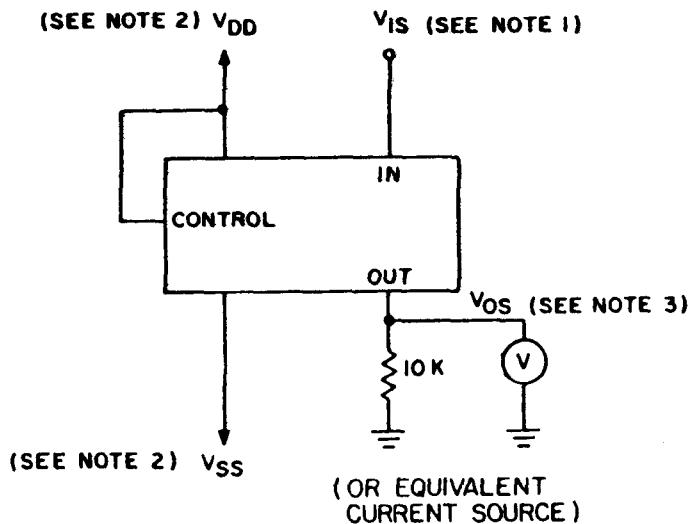
1.	$R_{ON1}$ NUMBER	$R_{ON1}$ (1)	$R_{ON1}$ (2)	$R_{ON1}$ (3)	$R_{ON1}$ (4)
	$V_{IS}$	+0.5 V	1.0 V	4.0 V	5.0 V

2. Conditions  $V_{DD}$  and  $V_{SS}$ :  $V_{DD} = +5.0$  V,  $V_{SS} = 0$  V.
3. Translation from  $V_{OS}$  to  $R_{ON}$ :

$$R_{ON} = \frac{V_{IS} - V_{OS}}{V_{OS} / 10 \text{ k}\Omega}$$

4. See table III for complete terminal conditions.

FIGURE 7. ON resistance test.



## NOTES:

	R <sub>ON2</sub> NUMBER	R <sub>ON2</sub> (1)	R <sub>ON2</sub> (2)	R <sub>ON2</sub> (3)
1.	V <sub>IS</sub>	-5.0 V	+0.6 V	+5.0 V

2. Conditions V<sub>DD</sub> and V<sub>SS</sub>: V<sub>DD</sub> = +7.5 V, V<sub>SS</sub> = -7.5 V.

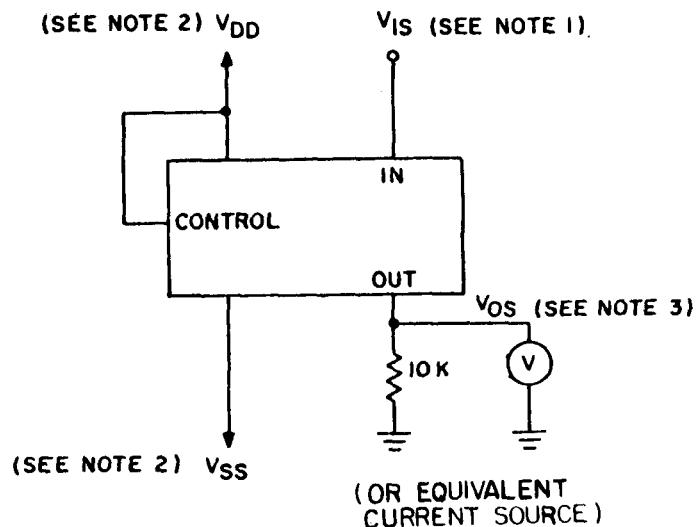
3. Translation from V<sub>OS</sub> to R<sub>ON</sub>:

$$R_{ON} = \frac{V_{IS} - V_{OS}}{V_{OS} / 10 \text{ k}\Omega}$$

4. See table III for complete terminal conditions.

5. At the manufacturer's option, during R<sub>ON2</sub> (1) tests, V<sub>DD</sub>, V<sub>SS</sub>, and V<sub>IS</sub> may be varied provided the absolute value equals +15.0 V.

FIGURE 8. ON resistance test.



## NOTES:

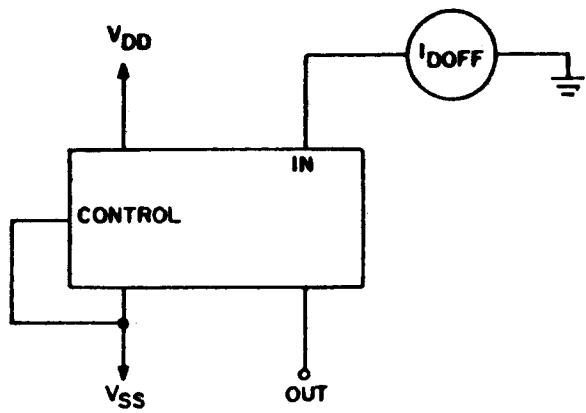
$R_{ON3}$ NUMBER	$R_{ON3}$ (1)	$R_{ON3}$ (2)	$R_{ON3}$ (3)
$V_{IS}$	+2.5 V	5.0 V	7.5 V

2. Conditions  $V_{DD}$  and  $V_{SS}$ :  $V_{DD} = +10.0$  V,  $V_{SS} = 0$  V.
3. Translation from  $V_{OS}$  to  $R_{ON}$ :

$$R_{ON} = \frac{V_{IS} - V_{OS}}{V_{OS} / 10 \text{ k}\Omega}$$

4. See table III for complete terminal conditions.

FIGURE 9. ON resistance test.



## NOTES:

1. 

$I_{DOFF}$ NUMBERS	$V_{DD}$	$V_{SS}$	Out
$I_{DOFF-1}$	+5.0 V	GND	+2.5 V
$I_{DOFF-2}$	GND	-5.0 V	-2.5 V
$I_{DOFF-3}$	+10.0 V	GND	+5.0 V
$I_{DOFF-4}$	GND	-10.0 V	-5.0 V
$I_{DOFF-5}$	+15.0 V	GND	+7.5 V
$I_{DOFF-6}$	GND	-15.0 V	-7.5 V
2. Identical measurements shall be performed on switch A, switch B, switch C and switch D.

FIGURE 10. Switch leakage current.

TABLE III. Group A inspection for device type 01. 1/

Symbol	MIL-STD-883 Cases A, C,D,X,Y method	Test limits												Measured terminal TC = 25°C	Subgroup 1 TC = 25°C	Subgroup 2 TC = 125°C	Subgroup 3 TC = -55°C	Unit ITC = -125°C		
		Test no.				Test no.				Test no.										
		I <sub>A</sub>	0 <sub>A</sub>	I <sub>B</sub>	C <sub>B</sub>	C <sub>C</sub>	V <sub>S</sub>	I <sub>C</sub>	0 <sub>C</sub>	0 <sub>D</sub>	I <sub>D</sub>	C <sub>D</sub>	C <sub>A</sub>	V <sub>DD</sub>	Min	Max	Min	Max		
V <sub>IC</sub> (pos)	1													1 mA	GND	C <sub>A</sub>	1.5		V	
	2														"	C <sub>B</sub>	"			
	3														"	C <sub>C</sub>	"			
	4														"	C <sub>D</sub>	"			
V <sub>IC</sub> (neg)	5														-1 mA	C <sub>A</sub>	-6			
	6														"	C <sub>B</sub>	"			
	7														"	C <sub>C</sub>	"			
	8														"	C <sub>D</sub>	"			
V <sub>SS</sub>	3005	9	15 V	GND	15 V	GND	15 V	GND	15 V	GND	15 V	GND	15 V	15 V	GND	15 V	V <sub>SS</sub>	-30	-550	nA
	"	10	GND	"	15 V	GND	15 V	GND	15 V	GND	15 V	GND	15 V	"	"	"	"	"	"	"
	"	11	"																	
V <sub>OH1</sub>	3006	12	5.0 V	GND	V <sub>IL1</sub>	V <sub>HL1</sub>	GND	"	"						GND	5.0 V	0B	4.95	4.95	V
	"	13	GND	"	V <sub>IL1</sub>	V <sub>HL1</sub>	GND	"	"							"	0C	"	"	"
	"	14															0D	"	"	
	"	15	5.0 V														0A	"	"	
V <sub>OH2</sub>	"	16																		
	"	17																		
	"	18	GND	"																
	"	19	12.5 V																	
V <sub>OL1</sub>	3007	20	12.5 V	GND	V <sub>IL2</sub>	V <sub>HL2</sub>	GND	"	"						GND	12.5 V	0B	11.25	11.25	mV
	"	21	16.0 V	GND	V <sub>IL2</sub>	V <sub>HL2</sub>	GND	"	"							"	0C	"	"	"
	"	22	"														0D	"	"	
	"	23	12.5 V	GND	V <sub>IL2</sub>	V <sub>HL2</sub>	GND	"	"								0A	"	"	
V <sub>OL2</sub>	"	24																		
	"	25																		
	"	26	12.5 V	GND	V <sub>IL2</sub>	V <sub>HL2</sub>	GND	"	"											
	"	27	"																	
I <sub>IL2</sub>	3010	28	15 V		15 V	"	15 V									15 V	15 V	All inputs together	+12	nA
I <sub>IL2</sub>	"	29	GND	"	15 V	GND	"	GND	"	"						GND	"		45	"
	"	30	"	"	"	GND	"	15 V	GND	"	"					"	15 V	GND	1.0	"
	"	31	"	"	"	"	"	"	"	"						"	15 V	GND	"	"
	"	32	"	"	"	"	"	"	"	"						"	15 V	GND	"	"
	"	33	15 V	GND	"	"	"	"	"	"						"	15 V	GND	2.0	"
	"	34	"	"	"	"	"	"	"	"						"	15 V	GND	"	"
	"	35	15 V	GND	"	"	"	"	"	"						"	15 V	GND	"	"
	"	36	"	"	"	"	"	"	"	"						"	15 V	GND	"	"
I <sub>IL2</sub>	3009	37	"	"	"	"	"	"	"	"							"	"	All inputs together	-12

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 01 - Continued. 1/

Symbol	MIL-STD-883 Cases A, C,D,X,Y method	Test no.	Test limits															
			I <sub>A</sub>	I <sub>B</sub>	I <sub>C</sub>	V <sub>S</sub>	I <sub>C</sub>	V <sub>C</sub>	I <sub>D</sub>	I <sub>D</sub>	C <sub>A</sub>	V <sub>DD</sub>	Measured terminal	Subgroup 1 TC = 25°C	Subgroup 2 TC = 125°C	Subgroup 3 TC = -55°C	Unit	
													MIn	Max	MIn	Max		
I <sub>IL2</sub>	3099	38	GND	15 V	C <sub>B</sub>	-1.0	-4.5	nA										
	"	39	"	"	"	"	"	"	"	"	"	"	CC	"	"	"	"	
	"	40	"	"	"	"	"	"	"	"	"	"	CA	"	"	"	"	
	"	41	"	"	"	"	"	"	"	"	"	"	IA	"	"	"	"	
	"	42	"	"	"	"	"	"	"	"	"	"	IB	-2.0	"	"	"	
	"	43	"	"	"	"	"	"	"	"	"	"	IC	"	"	"	"	
	"	44	"	"	"	"	"	"	"	"	"	"	ID	"	"	"	"	
	"	45	"	"	"	"	"	"	"	"	"	"						
R <sub>ON1</sub>		46	0.5 V	6/	0.5 V	5.0 V	0.5 V	0.5 V	6/	6/	0.5 V	5.0 V	0.4	700	750	550	Ω	
		47	6/	6/	0.5 V	5.0 V	5.0 V	0.5 V	6/	6/	0.5 V	5.0 V	0.4	700	750	550	Ω	
		48	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		49	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		50	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		51	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		52	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		53	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		54	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		55	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		56	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		57	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		58	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		59	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		60	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
		61	6/	6/	1.0 V	11.0 V	5.0 V	1.0 V	6/	6/	1.0 V	5.0 V	0.4	1.0 k	1.1 k	750	Ω	
R <sub>ON2</sub>		62	-5.0 V	7/	7/	-5.0 V	7.5 V	7.5 V	1.75 V	7/	7/	-5.0 V	7.5 V	0.4	250	300	250	Ω
		63	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		64	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		65	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		66	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		67	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		68	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		69	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		70	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		71	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		72	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
		73	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	6/	0.4	250	300	250	Ω
R <sub>ON3</sub>		74	2.5 V	8/	8/	2.5 V	10 V	10 V	2.5 V	8/	8/	2.5 V	10 V	0.4	450	500	350	Ω
		75	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		76	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		77	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		78	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		79	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		80	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		81	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		82	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		d3	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		84	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
		85	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	7/	0.4	450	500	350	Ω
I <sub>DFF1</sub>	Fig. 10	86	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/
I <sub>DFF2</sub>	"	87	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>DFF3</sub>	"	88	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>DFF4</sub>	"	89	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>DFF5</sub>	"	90	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>DFF6</sub>	"	91	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 01 - Continued. 1/

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02. 1/

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y	Test limits																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Subgroup 1 TC = 25°C	Subgroup 2 TC = 125°C	Subgroup 3 TC = -55°C	Unit	
V <sub>IC</sub> (pos)		1															GND	C <sub>B</sub>	1.5		V	
	2		I <sub>A</sub>	0 <sub>A</sub>	I <sub>B</sub>	C <sub>B</sub>	V <sub>SS</sub>	I <sub>C</sub>	0 <sub>C</sub>	0 <sub>D</sub>	I <sub>D</sub>	C <sub>D</sub>	C <sub>A</sub>	V <sub>DD</sub>		C <sub>C</sub>	C <sub>D</sub>	C <sub>A</sub>				
V <sub>IC</sub> (neg)		5														-1 mA	C <sub>B</sub>	-6				
	6															C <sub>C</sub>	C <sub>D</sub>	C <sub>A</sub>				
	7																					
	8																					
I <sub>2/3</sub>	3005	9	15 V	GND	15 V	GND	GND	"	15 V	GND	15 V	GND	GND	15 V	"	V <sub>SS</sub>	-30	-550			nA	
	10	"	3ND	15 V	GND	15 V	GND	"	15 V	GND	15 V	GND	"	15 V	"	"	"	"	"			
	11																					
V <sub>0H1</sub>	3006	12															GND	5.0 V	0B	4.95	4.95	V
	13																V <sub>TH1</sub>	"	"	"	"	
	14																V <sub>IL1</sub>	"	"	"	"	
	15																V <sub>TH1</sub>	"	"	"	"	
V <sub>0H2</sub>		16															GND	5.0 V	0B	4.95	4.95	V
	17																V <sub>IL1</sub>	"	"	"	"	
	18																V <sub>TH1</sub>	"	"	"	"	
	19																V <sub>IL2</sub>	"	"	"	"	
V <sub>0L1</sub>	3007	20															GND	12.5 V	0B	11.25	11.25	V
	21																V <sub>IL2</sub>	"	"	"	"	
	22																V <sub>TH1</sub>	"	"	"	"	
	23																V <sub>IL1</sub>	"	"	"	"	
V <sub>0L2</sub>		24															GND	5.0 V	0B	50	50	mV
	25																V <sub>IL1</sub>	"	"	"	"	
	26																V <sub>TH1</sub>	"	"	"	"	
	27																V <sub>IL2</sub>	"	"	"	"	
I <sub>1H1</sub>	3010	28	15 V		15 V	15 V	"	15 V								15 V	15 V	15 V	All inputs together	112	nA	
I <sub>1H2</sub>		29															GND	GND	"	45		
	30																GND	"	15 V	"	"	
	31																GND	"	"	"	"	
	32																GND	"	15 V	"	"	
	33																GND	"	"	"	"	
	34																GND	"	"	"	"	
	35																GND	"	"	"	"	
	36																GND	"	"	"	"	
I <sub>1L1</sub>	3009	37	"														GND	"	"	All inputs together	-12	

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - Continued.

Symbol	MIL-STD-883 method	Cases A, (C,D,X,Y)	Test limits													
			Subgroup 1				Subgroup 2				Subgroup 3				Unit TC = -55°C	
			TC = 25°C	TC = 125°C	TC = 105°C	TC = -20°C	TC = 25°C	TC = 125°C	TC = 105°C	TC = -20°C	Min	Max	Min	Max		
I <sub>IL2</sub>	3009	38	GND	GND	GND	GND	GND	GND	GND	GND	5.0 V	5.0 V	-1.0	-45	nA	
	39	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	40	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	41	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	43	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	44	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	45	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>ON1</sub>	46	0.5 V	6/	0.5 V	5.0 V	5.0 V	0.5 V	0.5 V	6/	0.5 V	5.0 V	5.0 V	0.5 V	0.5 V	400	400
	47	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	48	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	49	1.0 V	6/	1.0 V	6/	1.0 V	5.0 V	5.0 V	5.0 V	5.0 V	450	450				
	50	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	51	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	52	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	53	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	54	14.0 V	6/	6/	4.0 V	5.0 V	5.0 V	4.0 V	6/	4.0 V	5.0 V	5.0 V	5.0 V	5.0 V	550	550
	55	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	56	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	57	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	58	5.0 V	6/	6/	5.0 V	5.0 V	5.0 V	5.0 V	6/	5.0 V	5.0 V	5.0 V	5.0 V	5.0 V	400	400
	59	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	60	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	61	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>ON2</sub>	62	-5.0 V	7/	7/	-5.0 V	7.5 V	-7.5 V	-7.5 V	7/	-5.0 V	7.5 V	7.5 V	7.5 V	7.5 V	200	200
	63	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	64	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	65	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	66	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	67	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	68	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	69	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	70	5.0 V	7/	7/	5.0 V	7.5 V	7.5 V	5.0 V	7/	0.6 V	7.5 V	7.5 V	7.5 V	7.5 V	"	"
	71	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	72	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	73	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>ON3</sub>	74	2.5 V	8/	8/	2.5 V	10 V	10 V	2.5 V	8/	2.5 V	10 V	10 V	10 V	10 V	300	300
	75	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	76	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	77	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	78	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	79	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	80	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	81	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	82	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	83	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	84	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	85	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>OFF1</sub>	F19..10	86	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	9/	45	45
		"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>OFF2</sub>	"	87	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>OFF3</sub>	"	88	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>OFF4</sub>	"	89	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>OFF5</sub>	"	90	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>OFF6</sub>	"	91	"	"	"	"	"	"	"	"	"	"	"	"	"	"

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - Continued. 1/

1/ Pins not designated may be "high" level logic, "low" level logic, or open. Exceptions are as follows: V<sub>C</sub>(pos) tests, the V<sub>S5</sub> terminal shall be open; V<sub>C(neg)</sub> tests, the V<sub>D0</sub> terminal shall be open.

2/ I<sub>S</sub>S measurements shall be run in sequence.  
3/ When performing quisiente current measurements (I<sub>S</sub>S), the meter shall be placed  
that all currents flow through the meter. The output during the I<sub>S</sub>S measurement

what all currents flow through the meter. The outputs during the  $I_{SS}$  measurement shall be open.

	$V_{TH1}$	$V_{TH2}$	$V_A$	$V_{TH1} - V_{TH2}$	$V_A - V_{TH1}$	$V_A - V_{TH2}$
$I_1$	-0.1 V at 25°C, -0.1 V at 125°C, -0.1 V at 125°C, -0.1 V at 125°C,	-11.4 V at 25°C, -10.95 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-1.1 V at 25°C, -0.85 V at 125°C, -1.25 V at 125°C, -1.25 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,
$I_2$	-0.1 V at 25°C, -0.1 V at 125°C, -0.1 V at 125°C, -0.1 V at 125°C,	-11.4 V at 25°C, -10.95 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-1.1 V at 25°C, -0.85 V at 125°C, -1.25 V at 125°C, -1.25 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,
$I_3$	-0.1 V at 25°C, -0.1 V at 125°C, -0.1 V at 125°C, -0.1 V at 125°C,	-11.4 V at 25°C, -10.95 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-1.1 V at 25°C, -0.85 V at 125°C, -1.25 V at 125°C, -1.25 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,	-11.3 V at 25°C, -11.85 V at 125°C, -11.85 V at 125°C, -11.85 V at 125°C,

5/ The device manufacturer may, at his option, measure  $I_{IL}$  and  $I_{IH}$  at  $25^\circ\text{C}$  for each individual input or measure all inputs together.

options 6/ See figure 7-  
7/ See figure 8-  
8/ See figure 9-

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TABLE III. Group A inspection for device type 51 - Continued.

Symbol	Mil-STD-883 Method	Cases A, (Cases C,D,X,Y)												Test Limits													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Subgroup 1 $T_C = 25^\circ\text{C}$	Subgroup 2 $T_C = 125^\circ\text{C}$	Subgroup 3 $T_C = -55^\circ\text{C}$	Unit							
$V_{IC(\text{pos})}$	1	$I_A$	$O_A$	$O_B$	$I_B$	$C_B$	$C_C$	$V_{SS}$	$I_C$	$O_C$	$\theta_0$	$I_D$	$C_D$	$C_A$	$V_{DD}$	GND	$C_A$	$C_B$	$C_D$	1.5							
	2															1 mA	"	"	"								
	3															1 mA	"	"	"								
	4															1 mA	"	"	"								
$V_{IC(\text{neg})}$	5															-1 mA											
	6															-1 mA											
	7															-1 mA											
	8															-1 mA											
	9															1 mA											
	10															1 mA											
	11															1 mA											
	12															1 mA											
	13															1 mA											
	14															1 mA											
	15															1 mA											
	16															1 mA											
	17															1 mA											
	18															1 mA											
	19															1 mA											
	20															1 mA											
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	36															1 mA											
	37															1 mA											
	38															1 mA											
	39															1 mA											
	40															1 mA											
	41															1 mA											
	42															1 mA											
	43															1 mA											
	44															1 mA											
	45															1 mA											
	46															1 mA											
	47															1 mA											
	48															1 mA											
	49															1 mA											
	50															1 mA											
	51															1 mA											

See Footnotes at end of device type 52.

TABLE III. Group A inspection for device type 51 - Continued. 1/

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 51 - Continued. 1/

Symbol	MIL-STD-883 method	Cases A, (c,d,x,y)	Test Limits														
			1	2	3	4	5	6	7	8	9	10	II	12	13	14	
test no.	I <sub>A</sub>	0 <sub>A</sub>	I <sub>B</sub>	C <sub>B</sub>	V <sub>SS</sub>	I <sub>C</sub>	0 <sub>C</sub>	I <sub>D</sub>	C <sub>D</sub>	C <sub>A</sub>	V <sub>DD</sub>						
I <sub>ONH2</sub>	94	-5.0 V	6/	6/	-5.0 V	7.5 V	7.5 V	-7.5 V	6/	6/	7.5 V	7.5 V	0A	250	300	250	
	95	5.0 V	6/	6/	0.6 V	7.5 V	7.5 V	-5.0 V	6/	6/	-5.0 V	7.5 V	0A	400	450	300	
	96	0.6 V	6/	6/	0.6 V	7.5 V	7.5 V	0.6 V	6/	6/	0.6 V	7.5 V	0A	400	450	300	
	97	5.0 V	6/	6/	5.0 V	7.5 V	7.5 V	5.0 V	6/	6/	5.0 V	7.5 V	0A	400	450	300	
	98	0.6 V	6/	6/	0.6 V	7.5 V	7.5 V	0.6 V	6/	6/	0.6 V	7.5 V	0A	400	450	300	
	99	5.0 V	6/	6/	5.0 V	7.5 V	7.5 V	5.0 V	6/	6/	5.0 V	7.5 V	0A	400	450	300	
	100	0.6 V	6/	6/	0.6 V	7.5 V	7.5 V	0.6 V	6/	6/	0.6 V	7.5 V	0A	400	450	300	
I <sub>ONH3</sub>	101	5.0 V	6/	6/	5.0 V	7.5 V	7.5 V	5.0 V	6/	6/	0.6 V	7.5 V	0A	350	400	300	
	102	0.6 V	6/	6/	0.6 V	7.5 V	7.5 V	0.6 V	6/	6/	0.6 V	7.5 V	0A	350	400	300	
	103	5.0 V	6/	6/	5.0 V	7.5 V	7.5 V	5.0 V	6/	6/	5.0 V	7.5 V	0A	350	400	300	
	104	0.6 V	6/	6/	0.6 V	7.5 V	7.5 V	0.6 V	6/	6/	0.6 V	7.5 V	0A	350	400	300	
	105	5.0 V	6/	6/	5.0 V	7.5 V	7.5 V	5.0 V	6/	6/	5.0 V	7.5 V	0A	350	400	300	
	106	2.5 V	7/	7/	2.5 V	10 V	10 V	GND	2.5 V	7/	2.5 V	10 V	0A	450	500	350	
	107	10.0 V	7/	7/	5.0 V	10 V	10 V	"	"	7/	2.5 V	10 V	0A	650	700	500	
I <sub>OFF1</sub>	108	"	"	"	"	"	"	"	"	"	"	"	0A	500	550	400	
	109	"	"	"	"	"	"	"	"	"	"	"	0B	600	650	500	
	110	5.0 V	7/	7/	5.0 V	10 V	10 V	"	5.0 V	7/	5.0 V	10 V	0A	600	650	500	
	111	10.0 V	7/	7/	10.0 V	10 V	10 V	"	"	7/	5.0 V	10 V	0A	600	650	500	
	112	"	"	"	"	"	"	"	"	"	"	"	0B	600	650	500	
	113	"	"	"	"	"	"	"	"	"	"	"	0D	600	650	500	
	114	7.5 V	7/	7/	7.5 V	10 V	10 V	"	7.5 V	7/	7.5 V	10 V	0A	600	650	500	
I <sub>OFF2</sub>	115	10.0 V	7/	7/	10.0 V	10 V	10 V	"	10.0 V	7/	10.0 V	10 V	0A	600	650	500	
	116	"	"	"	"	"	"	"	"	"	"	"	0B	600	650	500	
	117	"	"	"	"	"	"	"	"	"	"	"	0D	600	650	500	
	118	8/	8/	8/	8/	8/	8/	GND	8/	8/	8/	8/	0A	45	45	45	
	119	"	"	"	"	"	"	"	"	"	"	"	0B	"	"	"	
	120	"	"	"	"	"	"	GND	"	"	"	"	0D	"	"	"	
	121	"	"	"	"	"	"	-10.0 V	"	"	"	"	GND	"	"	"	
I <sub>OFF3</sub>	122	"	"	"	"	"	"	GND	"	"	"	"	10 V	"	"	"	
	123	"	"	"	"	"	"	-15.0 V	"	"	"	"	GND	"	"	"	
	124	"	"	"	"	"	"	-15.0 V	"	"	"	"	GND	"	"	"	
	125	"	"	"	"	"	"	-10.0 V	"	"	"	"	GND	"	"	"	
	126	"	"	"	"	"	"	-10.0 V	"	"	"	"	GND	"	"	"	
	127	"	"	"	"	"	"	-10.0 V	"	"	"	"	GND	"	"	"	
	128	"	"	"	"	"	"	-10.0 V	"	"	"	"	GND	"	"	"	
C <sub>1s</sub>	129	9/	9/	9/	9/	9/	9/	GND	9/	9/	9/	9/	9/	0A	12	15	12
	130	"	"	"	"	"	"	GND	"	"	"	"	GND	"	1B	15	12
	131	"	"	"	"	"	"	GND	"	"	"	"	GND	"	1C	15	12
	132	10/	10/	10/	10/	10/	10/	GND	10/	10/	10/	10/	10/	0A	12	15	12
	133	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	0B	12	15	12
	134	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	0C	12	15	12
	135	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	0D	12	15	12
C <sub>1s</sub>	136	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
	137	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12
	138	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1C	12	15	12
	139	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1D	12	15	12
	140	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
	141	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12
	142	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1C	12	15	12
C <sub>1os</sub>	143	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1D	12	15	12
	144	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
	145	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12
	146	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1C	12	15	12
	147	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1D	12	15	12
	148	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
	149	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12
C <sub>1os</sub>	150	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1C	12	15	12
	151	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1D	12	15	12
	152	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
	153	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12
	154	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1C	12	15	12
	155	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1D	12	15	12
	156	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
C <sub>1os</sub>	157	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12
	158	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1C	12	15	12
	159	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1D	12	15	12
	160	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
	161	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12
	162	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1C	12	15	12
	163	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1D	12	15	12
C <sub>1os</sub>	164	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
	165	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12
	166	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1C	12	15	12
	167	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1D	12	15	12
	168	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1A	12	15	12
	169	11/	11/	11/	11/	11/	11/	GND	11/	11/	11/	11/	11/	1B	12	15	12

TABLE III. Group A inspection for device type 51 - Continued. 1/

Symbol	MIL-STD-883 method	Cases A, (C,D,X,Y)	Test Limits															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Test no.	I <sub>A</sub>	I <sub>A</sub>	I <sub>B</sub>	C <sub>B</sub>	C <sub>C</sub>	V <sub>SS</sub>	I <sub>C</sub>	0 <sub>C</sub>	0 <sub>D</sub>	I <sub>D</sub>	C <sub>D</sub>	C <sub>A</sub>	V <sub>DD</sub>	TC = 25°C	Subgroup 10 TC = 125°C	Subgroup 11 Unit TC = -55°C		
t <sub>PLH</sub>	3003	140	I <sub>N</sub>	OUT	I <sub>B</sub>	C <sub>B</sub>	GND	"	I <sub>C</sub>	0 <sub>C</sub>	I <sub>D</sub>	C <sub>D</sub>	C <sub>A</sub>	V <sub>DD</sub>	GND	5.0 V	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	
	Fig. 5	141														GND	5.0 V	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>
	"	142														GND	5.0 V	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>
	"	143														GND	5.0 V	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>
t <sub>PHL</sub>	"	144	I <sub>N</sub>	OUT	OUT	I <sub>B</sub>	GND	GND	I <sub>C</sub>	0 <sub>C</sub>	OUT	OUT	I <sub>D</sub>	V <sub>DD</sub>	GND	5.0 V	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	
	"	145																
	"	146																
	"	147																
t <sub>PHZ</sub>	Fig. 6	148	5.0 V	OUT	OUT	5.0 V	"	"	"	"	OUT	OUT	I <sub>N</sub>	5.0 V	GND	5.0 V	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	
	"	149																
	"	150																
	"	151																
t <sub>PZH</sub>	"	152	5.0 V	OUT	OUT	5.0 V	"	"	"	"	OUT	OUT	I <sub>N</sub>	5.0 V	GND	5.0 V	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	
	"	153																
	"	154																
	"	155																
t <sub>PLZ</sub>	"	156	GND	OUT	OUT	GND	I <sub>N</sub>	I <sub>B</sub>	I <sub>C</sub>	I <sub>D</sub>	GND	OUT	OUT	GND	GND	IN	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	
	"	157																
	"	158																
	"	159																
t <sub>PZL</sub>	"	160	GND	OUT	OUT	GND	I <sub>N</sub>	I <sub>B</sub>	I <sub>C</sub>	I <sub>D</sub>	GND	OUT	OUT	GND	GND	IN	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	
	"	161																
	"	162																
	"	163																

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52. 1/

Symbol	MLI- STD-883 method	Cases A, C,D,X,Y			Test limits												Subgroup 1 $T_C = 25^\circ C$			Subgroup 2 $T_C = 125^\circ C$		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	C <sub>B</sub> n	C <sub>C</sub> n	C <sub>A</sub> n	M <sub>Min</sub>	M <sub>Max</sub>	
	Test no.	I <sub>A</sub>	Q <sub>A</sub>	I <sub>B</sub>	C <sub>B</sub>	C <sub>C</sub>	V <sub>SS</sub>	I <sub>C</sub>	I <sub>D</sub>	I <sub>O</sub>	C <sub>O</sub>	C <sub>A</sub>	C <sub>D</sub>	GND	C <sub>B</sub> n	C <sub>C</sub> n	C <sub>A</sub> n	M <sub>Min</sub>	M <sub>Max</sub>	M <sub>Min</sub>	M <sub>Max</sub>	
V <sub>IC(pos)</sub>	1																					
	2																					
	3																					
	4																					
V <sub>IC(neg)</sub>	5																					
	6																					
	7																					
	8																					
I <sub>SS</sub> 2/3/ —	9	18 V	GND	18 V	GND	18 V	GND	18 V	GND	18 V	GND	18 V	GND	18 V	GND	18 V	18 V	18 V	18 V	18 V	18 V	
	10	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND
	11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>OH3</sub>	12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	13	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	14	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	15	15 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>OL3</sub>	16	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	17	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	18	15 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	19	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>IL1</sub>	20	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	21	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	22	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	23	5.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>JH2</sub>	24	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	25	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	26	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	27	10.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>JH3</sub>	28	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	29	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	30	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	31	15 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>IL1</sub>	32	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	33	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	34	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	35	5.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>IL2</sub>	36	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	37	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	38	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	39	10.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>IL3</sub>	40	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	41	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	43	15.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
I <sub>QL1</sub>	44	GND	"	0.4 V	"	5.0 V	GND	5.0 V	GND	5.0 V	GND	5.0 V	GND	5.0 V	GND	5.0 V	GND	5.0 V	GND	5.0 V	GND	5.0 V
	45	"	"	"	"	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"
	46	5.0 V	GND	"	"	"	"	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"
	47	GND	"	0.4 V	"	"	GND	"	"	GND	"	"	GND	"	"	GND	"	"	GND	"	"	GND

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 - Continued. 1/

Symbol	MIL-SID-883 method	Cases A, C,D,X,Y												Test limits													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Subgroup 1	Subgroup 2	Subgroup 3	Unit							
	test no.	I <sub>A</sub>	I <sub>B</sub>	I <sub>C</sub>	I <sub>D</sub>	I <sub>E</sub>	I <sub>F</sub>	I <sub>G</sub>	I <sub>H</sub>	I <sub>O</sub>	I <sub>O</sub>	I <sub>O</sub>	I <sub>O</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>			
I <sub>OL2</sub>	48	GND	1.5 V	GND	15 V	GND	15 V	GND	15 V	GND	1.5 V	1.5 V	"	GND	GND	GND	15 V	0.8	3.4	2.4	4.2	mA	n	n	n		
	49	"	15 V	GND	1.5 V	1.5 V	"	GND	GND	GND	15 V	0.8	0.51	-0.36	-0.64	n	n	n	n								
	50	GND	1.5 V	"	"	"	"	"	"	"	"	"	"	GND	GND	GND	15 V	0.8	0.51	-0.36	-0.64	n	n	n	n		
	51	GND	1.5 V	"	"	"	"	"	"	"	"	"	"	GND	GND	GND	15 V	0.8	0.51	-0.36	-0.64	n	n	n	n		
I <sub>OH1</sub>	52	"	4.6 V	GND	5.0 V	GND	5.0 V	GND	5.0 V	GND	4.6 V	4.6 V	"	GND	GND	GND	5.0 V	0.8	3.4	2.4	4.2	n	n	n	n		
	53	"	5.0 V	GND	5.0 V	5.0 V	"	GND	GND	GND	5.0 V	0.8	3.4	2.4	4.2	n	n	n	n								
	54	"	5.0 V	GND	5.0 V	5.0 V	"	GND	GND	GND	5.0 V	0.8	3.4	2.4	4.2	n	n	n	n								
	55	"	5.0 V	GND	5.0 V	5.0 V	"	GND	GND	GND	5.0 V	0.8	3.4	2.4	4.2	n	n	n	n								
I <sub>OH2</sub>	56	GND	13.5 V	GND	15 V	GND	15 V	GND	15 V	GND	13.5 V	13.5 V	"	GND	GND	GND	15 V	0.8	3.4	2.4	4.2	n	n	n	n		
	57	"	15 V	GND	13.5 V	GND	15 V	GND	15 V	GND	13.5 V	13.5 V	"	GND	GND	GND	15 V	0.8	3.4	2.4	4.2	n	n	n	n		
	58	"	15 V	GND	13.5 V	GND	15 V	GND	15 V	GND	13.5 V	13.5 V	"	GND	GND	GND	15 V	0.8	3.4	2.4	4.2	n	n	n	n		
	59	"	15 V	GND	13.5 V	GND	15 V	GND	15 V	GND	13.5 V	13.5 V	"	GND	GND	GND	15 V	0.8	3.4	2.4	4.2	n	n	n	n		
I <sub>II1</sub>	3010	60	18 V	"	18 V	18 V	"	18 V	18 V	"	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n						
	61	GND	"	GND	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n												
	62	"	GND	"	GND	18 V	GND	18 V	GND	18 V	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n						
	63	"	GND	"	GND	18 V	GND	18 V	GND	18 V	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n						
	64	"	GND	"	GND	18 V	GND	18 V	GND	18 V	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n						
	65	"	GND	"	GND	18 V	GND	18 V	GND	18 V	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n						
	66	"	GND	"	GND	18 V	GND	18 V	GND	18 V	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n						
	67	"	GND	"	GND	18 V	GND	18 V	GND	18 V	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n						
	68	"	GND	"	GND	18 V	GND	18 V	GND	18 V	18 V	18 V	"	GND	GND	GND	18 V	n	n	n	n						
I <sub>II2</sub>	3009	69	"	"	"	"	"	"	"	"	"	"	"	GND	GND	GND	"	"	"	"	"	All inputs together	-6.0	n	n	n	
	70	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	GND	GND	GND	GND	GND	GND	GND	GND	1.0	4.5	n	n	
	71	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	GND	GND	GND	GND	GND	GND	GND	GND	1.0	4.5	n	n
	72	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	GND	GND	GND	GND	GND	GND	GND	GND	1.0	4.5	n	n
	73	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	GND	GND	GND	GND	GND	GND	GND	GND	1.0	4.5	n	n
	74	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	GND	GND	GND	GND	GND	GND	GND	GND	1.0	4.5	n	n
	75	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	GND	GND	GND	GND	GND	GND	GND	GND	1.0	4.5	n	n
	76	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	GND	GND	GND	GND	GND	GND	GND	GND	1.0	4.5	n	n
	77	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	"	GND	GND	GND	GND	GND	GND	GND	GND	GND	1.0	4.5	n	n
R <sub>ON1</sub>	78	10.5 V	5/	5/	0.5 V	5.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450										
	80	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	81	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	82	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	83	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	84	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	85	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	86	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	87	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	88	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	89	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	90	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	91	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	92	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											
	93	1.0 V	5/	5/	1.0 V	0.5 V	0.5 V	"	5/	5/	5/	5.0 V	400	450	400	450											

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 - Continued. 1/

Symbol	MIL-STD-883 method	Test Targets												Measured terminal TC = 25°C	Subgroup 3 TC = 125°C	Subgroup 2 TC = -55°C	Subgroup 1 TC = 200°C		
		Cases A, C,D,X,Y				Cases B, C,D,X,Y				Cases C, YSS									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Min	Max	Min	Max
R <sub>OH2</sub>		94	-5.0 V	6/-	-5.0 V	7.5 V	-7.5 V	-5.0 V	6/-	-5.0 V	7.5 V	-7.5 V	-5.0 V	7.5 V	CA	200	250	200	200
		95	0.6 V	6/-	0.6 V	7.5 V	7.5 V	"	"	0.6 V	6/-	6/-	-5.0 V	7.5 V	CB	"	"	"	"
		96	0.6 V	6/-	0.6 V	7.5 V	7.5 V	"	"	0.6 V	6/-	6/-	0.6 V	7.5 V	CC	"	"	"	"
		98	5.0 V	6/-	5.0 V	7.5 V	7.5 V	"	"	5.0 V	6/-	6/-	5.0 V	7.5 V	CD	"	"	"	"
		99	5.0 V	6/-	5.0 V	7.5 V	7.5 V	"	"	5.0 V	6/-	6/-	5.0 V	7.5 V	CA	"	"	"	"
		100	5.0 V	6/-	5.0 V	7.5 V	7.5 V	"	"	5.0 V	6/-	6/-	5.0 V	7.5 V	CB	"	"	"	"
		101	5.0 V	6/-	5.0 V	7.5 V	7.5 V	"	"	5.0 V	6/-	6/-	5.0 V	7.5 V	CC	"	"	"	"
		102	5.0 V	6/-	5.0 V	7.5 V	7.5 V	"	"	5.0 V	6/-	6/-	5.0 V	7.5 V	CD	"	"	"	"
		103	5.0 V	6/-	5.0 V	7.5 V	7.5 V	"	"	5.0 V	6/-	6/-	5.0 V	7.5 V	CA	"	"	"	"
		104	5.0 V	6/-	5.0 V	7.5 V	7.5 V	"	"	5.0 V	6/-	6/-	5.0 V	7.5 V	CB	"	"	"	"
		105	5.0 V	6/-	5.0 V	7.5 V	7.5 V	"	"	5.0 V	6/-	6/-	5.0 V	7.5 V	CC	"	"	"	"
		106	12.5 V	7/-	2.5 V	10 V	GND	2.5 V	7/-	2.5 V	10 V	10 V	10 V	10 V	CA	300	350	300	300
		107	10.0 V	7/-	2.5 V	10 V	GND	2.5 V	7/-	2.5 V	10 V	10 V	10 V	10 V	CC	"	"	"	"
		108	10.0 V	7/-	2.5 V	10 V	GND	2.5 V	7/-	2.5 V	10 V	10 V	10 V	10 V	CD	"	"	"	"
		109	10.0 V	7/-	2.5 V	10 V	GND	2.5 V	7/-	2.5 V	10 V	10 V	10 V	10 V	CA	250	300	250	250
		110	5.0 V	7/-	5.0 V	10 V	GND	5.0 V	7/-	5.0 V	10 V	10 V	10 V	10 V	CB	"	"	"	"
		111	5.0 V	7/-	5.0 V	10 V	GND	5.0 V	7/-	5.0 V	10 V	10 V	10 V	10 V	CC	"	"	"	"
		112	5.0 V	7/-	5.0 V	10 V	GND	5.0 V	7/-	5.0 V	10 V	10 V	10 V	10 V	CD	"	"	"	"
		113	5.0 V	7/-	5.0 V	10 V	GND	5.0 V	7/-	5.0 V	10 V	10 V	10 V	10 V	CA	"	"	"	"
		114	7.5 V	7/-	7.5 V	10 V	GND	7.5 V	7/-	7.5 V	10 V	10 V	10 V	10 V	CB	"	"	"	"
		115	7.5 V	7/-	7.5 V	10 V	GND	7.5 V	7/-	7.5 V	10 V	10 V	10 V	10 V	CC	"	"	"	"
		116	7.5 V	7/-	7.5 V	10 V	GND	7.5 V	7/-	7.5 V	10 V	10 V	10 V	10 V	CD	"	"	"	"
		117	7.5 V	7/-	7.5 V	10 V	GND	7.5 V	7/-	7.5 V	10 V	10 V	10 V	10 V	CA	"	"	"	"
I <sub>DFF1</sub>	F19, 101	118	8/-	8/-	8/-	8/-	GND	8/-	8/-	8/-	8/-	8/-	8/-	8/-	GND	"	"	-45	-45
I <sub>DFF2</sub>		119	"	"	"	"	"	-5.0 V	"	"	"	"	"	"	GND	"	"	45	45
I <sub>DFF3</sub>		120	"	"	"	"	"	GND	"	"	"	"	"	"	GND	"	"	45	45
I <sub>DFF4</sub>		121	"	"	"	"	"	-10.0 V	"	"	"	"	"	"	10 V	"	"	-45	-45
I <sub>DFF5</sub>		122	"	"	"	"	"	GND	"	"	"	"	"	"	GND	"	"	45	45
I <sub>DFF6</sub>		123	"	"	"	"	"	-15.0 V	"	"	"	"	"	"	GND	"	"	45	45
C <sub>C</sub>		3012	124	9/-	9/-	GND	9/-	9/-	GND	9/-	9/-	GND	9/-	9/-	GND	9/-	9/-	12	12
C <sub>CS</sub>		128	9/-	9/-	GND	GND	9/-	9/-	GND	9/-	9/-	GND	9/-	9/-	GND	9/-	9/-	12	12
C <sub>OS</sub>		132	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10/-	10	10
C <sub>C105</sub>		136	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11A,0A	11A,0A
		137	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11B,0B	11B,0B
		138	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11C,0C	11C,0C
		139	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11/-	11D,0D	11D,0D

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 - Continued. 1/

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y												Test Limits						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Subgroup 9 TC = 25°C	Subgroup 10 TC = 125°C	Subgroup 11 TC = -55°C	
t <sub>PLH</sub>	3003 Fig. 5	140 141 142 "	IN OUT OUT OUT	I <sub>A</sub> 0 <sub>B</sub> I <sub>B</sub> I <sub>C</sub>	C <sub>C</sub> V <sub>SS</sub> GND GND	V <sub>DD</sub> 5.0 V 5.0 V 5.0 V	GND " " " "	I <sub>C</sub> IN IN IN	0 <sub>D</sub> OUT OUT OUT	I <sub>D</sub> 0 <sub>D</sub> 0 <sub>D</sub> IN	C <sub>D</sub> C <sub>A</sub> V <sub>DD</sub> 5.0 V	GND " " " "	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	4 " " " "	70 " " " "	7 " " " "	85 " " " "	4 " " " "	70 " " " "	ns " " " "
t <sub>PLL</sub>	" 144 145 146 147	IN OUT OUT OUT	I <sub>A</sub> 0 <sub>B</sub> I <sub>B</sub> I <sub>C</sub>	C <sub>C</sub> V <sub>SS</sub> GND GND	V <sub>DD</sub> 5.0 V 5.0 V 5.0 V	GND " " " "	GND " " " "	IN IN IN IN	OUT OUT OUT OUT	OUT OUT OUT OUT	I <sub>D</sub> 0 <sub>D</sub> 0 <sub>D</sub> IN	GND " " " "	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	4 " " " "	60 " " " "	60 " " " "	80 " " " "	4 " " " "	50 " " " "	ns " " " "
t <sub>PZH</sub>	Fig. 6 148 149 150 151	5.0 V OUT OUT OUT	I <sub>A</sub> 0 <sub>B</sub> I <sub>B</sub> I <sub>C</sub>	C <sub>C</sub> V <sub>SS</sub> GND GND	V <sub>DD</sub> 5.0 V 5.0 V 5.0 V	GND " " " "	GND " " " "	IN IN IN IN	OUT OUT OUT OUT	OUT OUT OUT OUT	I <sub>D</sub> 0 <sub>D</sub> 0 <sub>D</sub> IN	GND " " " "	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	4 " " " "	70 " " " "	70 " " " "	90 " " " "	4 " " " "	55 " " " "	ns " " " "
t <sub>PZH</sub>	Fig. 6 152 153 154 155	5.0 V OUT OUT OUT	I <sub>A</sub> 0 <sub>B</sub> I <sub>B</sub> I <sub>C</sub>	C <sub>C</sub> V <sub>SS</sub> GND GND	V <sub>DD</sub> 5.0 V 5.0 V 5.0 V	GND " " " "	GND " " " "	IN IN IN IN	OUT OUT OUT OUT	OUT OUT OUT OUT	I <sub>D</sub> 0 <sub>D</sub> 0 <sub>D</sub> IN	GND " " " "	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	4 " " " "	70 " " " "	70 " " " "	90 " " " "	4 " " " "	55 " " " "	ns " " " "
t <sub>PZL</sub>	Fig. 6 156 157 158 159	GND OUT OUT OUT	I <sub>A</sub> 0 <sub>B</sub> I <sub>B</sub> I <sub>C</sub>	C <sub>C</sub> V <sub>SS</sub> GND GND	V <sub>DD</sub> 5.0 V 5.0 V 5.0 V	GND " " " "	GND " " " "	IN IN IN IN	OUT OUT OUT OUT	OUT OUT OUT OUT	I <sub>D</sub> 0 <sub>D</sub> 0 <sub>D</sub> IN	GND " " " "	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	4 " " " "	70 " " " "	70 " " " "	90 " " " "	4 " " " "	55 " " " "	ns " " " "
t <sub>PZL</sub>	Fig. 6 160 161 162 163	GND OUT OUT OUT	I <sub>A</sub> 0 <sub>B</sub> I <sub>B</sub> I <sub>C</sub>	C <sub>C</sub> V <sub>SS</sub> GND GND	V <sub>DD</sub> 5.0 V 5.0 V 5.0 V	GND " " " "	GND " " " "	IN IN IN IN	OUT OUT OUT OUT	OUT OUT OUT OUT	I <sub>D</sub> 0 <sub>D</sub> 0 <sub>D</sub> IN	GND " " " "	I <sub>A</sub> to 0 <sub>A</sub> I <sub>B</sub> to 0 <sub>B</sub> I <sub>C</sub> to 0 <sub>C</sub> I <sub>D</sub> to 0 <sub>D</sub>	4 " " " "	70 " " " "	70 " " " "	90 " " " "	4 " " " "	55 " " " "	ns " " " "

1/ Pins not designated may be "high" level logic, "low" level logic, or open. Exceptions are as follows: V<sub>IC</sub>(pos) tests, the V<sub>SS</sub> terminal shall be open; V<sub>IC</sub>(neg) tests, the V<sub>DD</sub> terminal shall be open.

2/ ISS measurements shall be run in sequence.

When performing quiescent current measurements (ISS), the meter shall be placed so that all currents flow through the meter. The outputs during the ISS measurement shall be open.

4/ The device manufacturer may, at his option, measure I<sub>IL</sub> and I<sub>IH</sub> at 25°C for each individual input or measure all inputs together.

5/ See figure 7.

6/ See figure 8.

7/ See figure 9.

8/ See figure 10.

9/ C<sub>C</sub> and C<sub>S</sub> - connect capacitance bridge between measured input terminal and V<sub>SS</sub>.

frequency = 1 MHz.

10/ C<sub>OS</sub> - connect capacitance bridge between measured output terminal and V<sub>SS</sub>,

frequency = 1 MHz.

11/ C<sub>OIS</sub> - connect capacitance bridge between measured input and output terminals,

frequency = 1 MHz.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of method 5005 of MIL-STD-883 and as follows:

- a. Class S steady state life (accelerated) test circuits shall be submitted to the qualifying activity for approval. When the alternate steady state life test is used, the circuit on figure 4, or equivalent, shall be used.
- b. A special subgroup shall be added using an LTPD of 15 for classes S and B, and shall be performed on each inspection lot for initially qualified device types 01 and 02, and measured only for initial qualification and after process or design changes for initially qualified device types 51 and 52. This subgroup shall consist of a high voltage test of the input protection circuits,  $V_{ZAP}$  (see 4.5.3).
- c. End-point electrical parameters shall be as specified in table II herein and shall consist only of those subgroups specified in table IIa of test method 5005 of MIL-STD-883, and table II herein also. Delta limits shall apply only to subgroup 5 of group B inspections and shall consist of tests specified in table IV herein.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table III of method 5005 of MIL-STD-883 and as follows:

- a. End-point electrical parameters shall be as specified in table II herein. Delta limits shall apply only to subgroup 1 of group C inspection and shall consist of tests specified in table IV herein.
- b. Steady-state life test (method 1005 of MIL-STD-883) conditions:
  - (1) Test condition D and as specified in 4.5.2 and as shown on figure 4, or equivalent.
  - (2)  $T_A = +125^\circ\text{C}$  minimum.
  - (3) Test duration, 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table IV of method 5005 of MIL-STD-883. End-point electrical parameters shall be as specified in table II herein.

4.4.5 Group E inspection. Group E inspection is required only for device types intended to be marked as radiation hardened (see 3.6.1). When group E testing is performed it shall be in accordance with table V of method 5005 of MIL-STD-883 and 4.5.5 herein. For class S devices, the total dose radiation testing shall be included as an additional test in the wafer lot acceptance of method 5007 of MIL-STD-883.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows:

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit  $V_{SS}$  terminal, unless otherwise specified. Currents given are conventional current and positive when flowing into the referenced terminal.

4.5.2 Burn-in and life test cooldown procedures. Burn-in and life test cooldown procedures shall be in accordance with MIL-STD-883 methods 1005 and 1015.

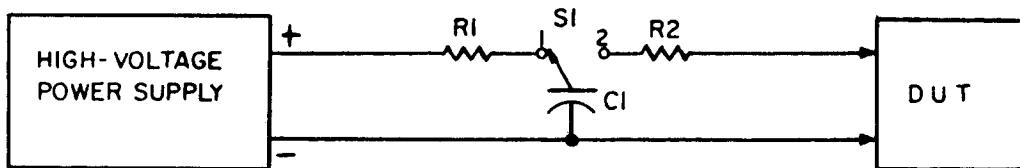
TABLE IV. Delta limits 025°C.

Parameter 1/	Device types	
	01,02	51, 52
I <sub>SS</sub>	±25 nA	±25 nA
V <sub>OL1</sub>	±.04 V	---
V <sub>OH1</sub>	±.08 V	---
I <sub>OL1</sub>	---	±15%
I <sub>OH1</sub>	---	±15%

- 1/ Each of the above parameters shall be recorded before and after the required burn-in and life tests to determine delta's ( $\Delta$ ).

4.5.3 High voltage ( $V_{ZAP}$ ) test or input protection circuits. All input terminals (up to a maximum of 4) of the DUT shall be subjected to a voltage pulse from a 100 pF source charged to 400 V. This destructive test shall be conducted as follows using the test circuit on figure 11.

- a. Measure I<sub>IL</sub> and I<sub>IH</sub> at the inputs selected, as stated above, at 25°C. The test limit for each input tested shall be ±10 nA at the specified V<sub>DD</sub>. Measure I<sub>SS</sub> on the DUT at 25°C. The test limit for this measurement shall be increased a maximum of 20 percent of the specified I<sub>SS</sub> table III limit at the specified V<sub>DD</sub>.



$$V_{ZAP} = 400 \text{ V charge on } C_1.$$

$1 \text{ M}\Omega \leq R_1 \leq 50 \text{ M}\Omega$   
 $R_2 = 1.5 \text{ k}\Omega$   
 $C_1 = 100 \text{ pF}$   
 $S_1 = \text{Hg-wetted "bounceless" relay}$

FIGURE 11. High voltage ( $V_{ZAP}$ ) test circuit.

- b.  $V_{ZAP}$  is applied to DUT in the following modes (see table V) by changing C1 to  $V_{ZAP}$  with S1 in position 1 and then switching to position 2.

TABLE V. Modes for high voltage test.

Mode	+ Terminal	- Terminal
1	$V_{DD}$	Control input
2	Control input	$V_{SS}$

c. Within 24 hours repeat the  $I_{SS}$ ,  $I_{IL}$ , and  $I_{IH}$  measurements on the same terminals as performed above. If a DUT exhibits leakage currents in excess of the specified limits after the  $V_{ZAP}$  test, it shall be classified as a failure.

4.5.4 Quiescent supply current ( $I_{SS}$  test). When performing quiescent supply current measurements ( $I_{SS}$ ), the meter shall be placed so that all currents flow through the meter.

4.5.5 Radiation hardness assurance (RHA) testing. The RHA testing shall be performed in accordance with test procedures and sampling specified in table V of method 5005 of MIL-STD-883 and herein:

- a. Before irradiation, selected samples shall be assembled in qualified packages and pass the governing electrical parameters (group A subgroup 1 at  $25^{\circ}\text{C}$ ) and also be subjected to the threshold-voltage test in table VIII in order to calculate the delta threshold ( $\Delta V_T$ ) after irradiation.
- b. The devices shall be subjected to a total radiation dose as specified in MIL-M-38510 for the radiation hardness assurance (RHA) level being tested, and meet the end point electrical parameters as defined in table VI at  $25^{\circ}\text{C}$ , after exposure. The start and completion of the end point electrical parameter measurements shall not exceed 2 hours following irradiation.
- c. Threshold-voltage test circuit conditions shall be as specified in table VIII and figure 12. In situ and remote testing shall be performed with the devices biased in accordance with table VII and bias may be interrupted for up to 1 minute to remove devices to the remote bias fixture.
- d. After irradiation, the devices shall pass the truth table test as specified in subgroup 7 in table III or if subgroup 7 is not required, then an equivalent truth table test shall be performed.

TABLE VI. Radiation hardening end-point electrical parameters at  $25^{\circ}\text{C}$ .

Parameter	All device types	$V_{DD}$	
		Device types	
		01, 02	51, 52
$V_{TN}$	0.3 V min	$V_{DD} = 10\text{ V}$	$V_{DD} = 10\text{ V}$
$V_{TP}$	2.8 V max	$V_{DD} = 10\text{ V}$	$V_{DD} = 10\text{ V}$
$\Delta V_T$	1.4 V	$V_{DD} = 10\text{ V}$	$V_{DD} = 10\text{ V}$
$I_{SS}$	100 x max limit	$V_{DD} = 15\text{ V}$	$V_{DD} = 18\text{ V}$
$t_{PLH}$	1.35 x max limit	$V_{DD} = 5\text{ V}$	$V_{DD} = 5\text{ V}$
$t_{PHL}$	1.35 x max limit	$V_{DD} = 5\text{ V}$	$V_{DD} = 5\text{ V}$

TABLE VII. Bias during exposure to radiation.

Device type	Pin connections		
	$V_{DD} = 10\text{ V dc}$ (through a 30- to 60 k $\Omega$ resistor)	$V_{SS} = \text{GND}$	$V_{DD} = 10\text{ V dc}$
01, 51	1, 4, 5, 6, 8, 11, 12, 13	7	14
02, 52	1, 4, 5, 6, 8, 11, 12, 13	7	14

Pins not designated are open or connected to 10 V dc through a 30- to 60 kilohm resistor.

4.6 Data reporting. When specified in the acquisition document, a copy of the following data, as applicable, shall be supplied.

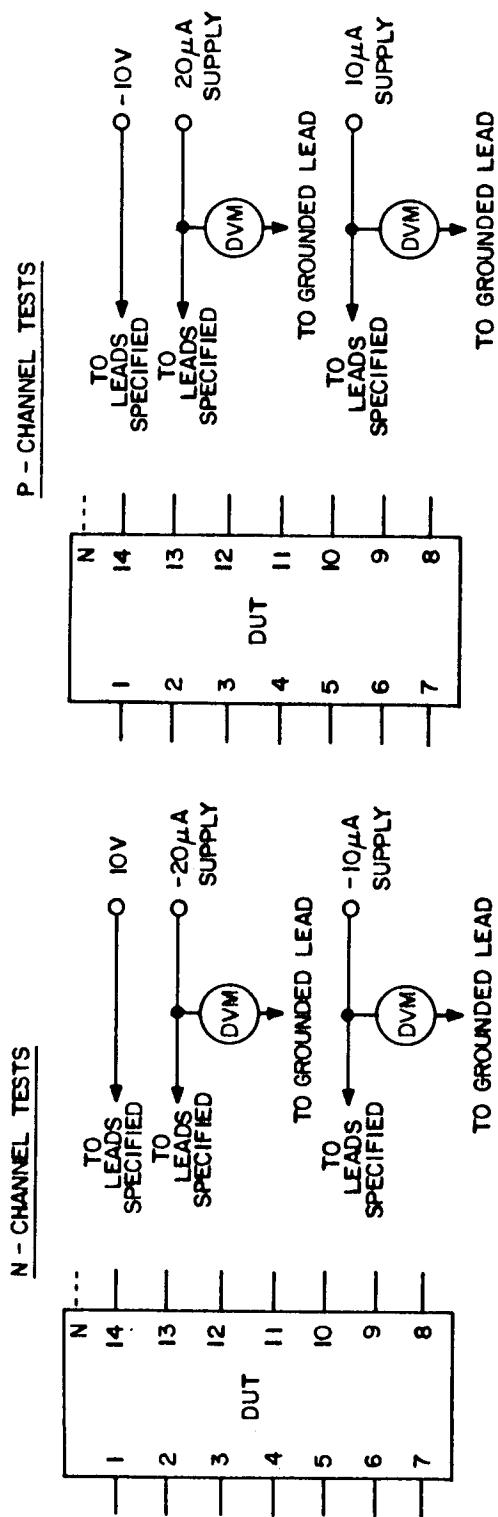


FIGURE 12. Threshold-voltage test circuit.

TABLE VIII. Threshold - voltage test circuit conditions.

Device type	GND	10 V	$V_{TN}$ measured at		GND	10 V	$V_{TP}$ measured at	
			-20 $\mu$ A supply	-10 $\mu$ A supply				
01, 51	13	5, 6, 12, 14		7	13	5-7, 12		14
02, 52	13	5, 6, 12, 14		7	13	5-7, 12		14

- a. Attributes data for all screening tests (see 4.2) and variables data for all static burn-in, dynamic burn-in, and steady state life tests (see 3.5).
- b. A copy of each radiograph.
- c. The quality conformance inspection data (see 4.4).
- d. Parameter distribution data on parameters evaluated during burn-in (see 3.5).
- e. Final electrical parameters data (see 4.2c).

## 5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

## 6. NOTES

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Ordering data. The acquisition document should specify the following:

- a. Complete part number (see 1.2).
- b. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.
- c. Requirements for certificate of compliance, if applicable.
- d. Requirements for notification of change of product or process to the contracting activity in addition to notification to the qualifying activity, if applicable.
- e. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action and reporting of results, if applicable.
- f. Requirements for product assurance options.
- g. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements shall not affect the part number. Unless otherwise specified, these requirements shall not apply to direct purchase by or direct shipment to the Government.
- h. Requirements for "JAN" marking.
- i. Requirements for total dose radiation testing (see 3.6.1 and 4.5.5), if applicable.

6.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-M-38510, MIL-STD-1331, and as follows:

$C_i$ and $C_C$	- - - - -	Input terminal-to-V <sub>SS</sub> capacitance.
$C_{ios}$	- - - - -	Switch input to output capacitance.
$C_{os}$	- - - - -	Output terminal-to-V <sub>SS</sub> capacitance.
$GND$	- - - - -	Ground. Zero voltage potential.
$I_{SS}$	- - - - -	Quiescent supply current.
$R_{on}$	- - - - -	Switch on resistance in voltage using 1 mA current.
$TA$	- - - - -	Free air temperature.
$V_{DD}$	- - - - -	Positive supply voltage.
$V_{IS}$	- - - - -	Input signal.
$V_{OS}$	- - - - -	Output signal.
$V_{SS}$	- - - - -	Negative supply voltage.
$V_{ZAP}$	- - - - -	Input test voltage.

**6.4 Logistic support.** Lead materials and finishes (see 3.3) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class S for National Aeronautics and Space Administration or class B for Department of Defense (see 1.2.2), lead finish C (see 3.3). Longer length leads and lead forming shall not affect the part number.

**6.5 Substitutability.** The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information shall not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-M-38510.

Military device type	Generic-industry type
01	4016A
02	4066A
51	4016B
52	4066B

**6.6 Handling.** MOS devices must be handled with certain precautions to avoid damage due to accumulation of static charge. Input protective devices have been designed in the chip to minimize the effect of this static build up. However, the following handling practices are recommended:

- a. Devices should be handled on benches with conductive and grounded surface.
- b. Ground test equipment and tools.
- c. Do not handle devices by the leads.
- d. Store devices in conductive foam or carriers.
- e. Avoid use of plastic, rubber, or silk in MOS areas.
- f. Maintain relative humidity above 50 percent, if practical.

**6.7 Changes from previous issue.** Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

**Custodians:**

Army - ER  
Navy - EC  
Air Force - 17  
NASA - NA

**Preparing activity:**  
NASA - NA

**Review activities:**

Army - MI  
Air Force - 11, 19, 85, 99  
DLA - ES

(Project 5962-0951)

**User activities:**

Army - SM, AR  
Navy - AS, CG, MC, OS, SH

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MIL-M-38510/58C

## 2. DOCUMENT TITLE

## 3a. NAME OF SUBMITTING ORGANIZATION

## b. ADDRESS (Street, City, State, ZIP Code)

## 5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

## 6. REMARKS

## 7a. NAME OF SUBMITTER (Last, First, MI) - Optional

## c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

## 4. TYPE OF ORGANIZATION (Mark one)

 VENDOR USER MANUFACTURER OTHER (Specify): \_\_\_\_\_

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## b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

## d. DATE OF SUBMISSION (YYMMDD)